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METHOD AND APPARATUS FOR CONTROLLING A PIEZOELECTRIC ACTUATOR

Field Of The Invention

The present invention relates to a method and an apparatus for controlling a piezoelectric actuator

5 Background Information

A method and an apparatus for controlling a piezoelectric actuator are described in European Patent No. 11 38 902. In the procedure that is described there, the voltage that is applied to the piezoelectric actuator is detected and evaluated at specified times. The purpose of this evaluation is a possible closed-loop control of the voltage and/or a monitoring of the
10 piezoelectric actuator.

Piezoelectric actuators are used in particular in piezoelectric injectors, which in turn are used for fuel metering in internal combustion engines. A piezoelectric injector of this type includes, among other things, a piezoceramic that is prestressed with a spring and that
15 essentially behaves like a spring-mass system. If the piezoelectric actuator is charged or discharged with cyclically applied electrical current, the voltage curve upon charging and discharging is essentially step-shaped. Even if there is a constant electrical charge in the piezoelectric actuator, applying compression to the piezoelectric actuator results in a decrease
20 in voltage, while applying tension to the piezoelectric actuator results in an increase in voltage. This causes a voltage overshoot and undershoot, respectively. In general, this means that the oscillation of the spring-mass system of the prestressed piezoelectric actuator causes an overshooting and undershooting of the voltage. This occurs in particular during and just after the end of the charging or discharging operation.

25 In addition, the fuel pressure acts upon the piezoelectric actuator also as a result of hydraulic effects. Through the injection that occurs at the end of the charging operation or through the termination of the injection, pressure waves are generated in the fuel, and these pressure waves act upon the piezoelectric actuator as a result of hydraulic effects, also causing the piezoelectric actuator to oscillate, thus causing voltage oscillations.
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